



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/775,702	02/09/2004	Ikuya Yagisawa	IIP-5094	9171
24956	7590	05/03/2007	EXAMINER	
MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.			BRADLEY, MATTHEW A	
1800 DIAGONAL ROAD			ART UNIT	PAPER NUMBER
SUITE 370			2187	
ALEXANDRIA, VA 22314			MAIL DATE	DELIVERY MODE
			05/03/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/775,702	YAGISAWA ET AL.
	Examiner	Art Unit
	Matthew Bradley	2187

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 09 February 2007.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 22-43 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 22,23,28-34 and 39-43 is/are rejected.
- 7) Claim(s) 24-27 and 35-38 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All
 - b) Some *
 - c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) Notice of Informal Patent Application
- 6) Other: _____

DETAILED ACTION

Response to Amendment

This Office Action has been issued in response to amendment filed 9 February 2007. Applicant's arguments have been carefully and fully considered but they are not persuasive. Accordingly, this action has been made FINAL.

Claim Status

Claims 22-43 remain pending and are ready for examination.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 22-23, 28-34 and 39-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeKoning et al (U.S. 5,790,773), hereinafter referred to as DeKoning, and in view of Sicola et al (U.S. 6,643,795), hereinafter referred to as Sicola.

As per independent claims 22 and 33, DeKoning teach, a plurality of disks including first disks configuring a RAID group (Figure 1 item 110 as taught in Column 4 lines 8-18) and at least one second disk (Figure 1 item 112 as taught in Column 4 line 48 to Column 5 line 8), wherein each of the first disks store one of data received from a computer coupled to the storage system or parity data used for recovering the data received from the computer, (Column 4 lines 34-47) and wherein the at least one second disk is to be used as a spare disk; and (Column 4 lines 55-67).

DeKoning teach the use of the spare disks being used as replacements for a failed disk in the RAID subsystem, but does not explicitly teach, automatic implementation of a spare in the event of a failure.

Sicola teach, a control section configured to hold an error status of each of the first disks, (Column 4 lines 44-53 taught as a 'heartbeat') and to start to mirror data between one of the first disks and the at least one second disk when the error status of the one of the first disks matches a predetermined first criterion, (Column 4 line 54 to Column 5 line 8) wherein, after starting to mirror data between the one of the first disks and the at least one second disk, the control section is configured to stop mirroring data between the one of the first disks and the at least one second disk and start to mirror data between another one of the first disks and the at least one second disk, according to the error status of the one of the first disks and the another one of the first disks (Column 4 line 44 to Column 5 line 8 and as taught in the Abstract as failover from a primary node to an alternate node and further as shown in Figure 14 with respect to Column 3 lines 56-65 that disclose 'mirroring'). *The Examiner notes that Sicola teach the use of a heartbeat to determine if a disk has failed. Upon determining that a disk has failed due to the heartbeat, or 'an error status of a disk' as instantly claimed', the system of Sicola fails over to another controller and thus another disk. As taught in Sicola et al Column 3 lines 56-65, mirroring is in use by the system. Thus when the heartbeat monitoring determines failure, the system of Sicola stops mirroring and fails over to start mirroring to a different disk.*

DeKoning and Sicola are analogous art because they are from the same field of endeavor namely, backup storage systems.

At the time of invention, it would have been obvious to one of even rudimentary skill in the art, having both the teachings of DeKoning and Sicola before him/her to combine the automatic failover of a primary node to an alternate node of Sicola with DeKoning for the benefit of not having to re-boot a remote node and not having to re-start local applications currently running.

The suggestion for doing so would have been that, automatic storage node failover does not necessitate re-booting of the remote node or re-starting local applications (Column 3 lines 9-13 of Sicola).

Therefore, it would have been obvious to combine DeKoning with Sicola for the benefit of not having to re-boot a remote node and not having to re-start local applications currently running to obtain the invention as specified in claims 22-23, 28-34 and 39-43.

As per dependent claims 23 and 34, the combination of DeKoning and Sicola teach, the control section is configured to compare the error status of each of the first disks, and based on the result of error status comparison between the one of the first disks and the another one of the first disks, the control section is configured to stop mirroring data between the one of the first disks and the at least one second disk and start to mirror data between the another one of the first disks and the at least one second disk (Column 4 lines 44-53 of Sicola). *The Examiner notes that the heartbeat monitoring of Sicola monitors the status of each drive at the local sites. When heartbeat*

failure is detected at the primary node, the system fails over to the alternate node.

Thus, the system of Sicola monitors the error status of each disk has shown by the monitoring of the heartbeat failure.

As per dependent claims **28** and **39**, the combination of DeKoning and Sicola teach, wherein the error status of each of the first disks is an error count of each of the first disks, and when the error count of the another one of the first disks becomes larger than the error count of the one of the first disks, the control section is configured to stop mirroring data between the one of the first disks and the at least one second disk and start to mirror data between the another one of the first disks and the at least one second disk (Column 4 lines 44-53 of Sicola).

As per dependent claims **29** and **40**, the combination of DeKoning and Sicola teach, wherein information indicating a pair of disks configuring a mirroring pair is output from the storage system to a management computer coupled to the storage system (Column 6 lines 63-66).

As per dependent claims **30** and **41**, the combination of DeKoning and Sicola teach, wherein the predetermined first criterion is updated based on the error status of the first disks configuring a RAID group (Column 4 lines 44-53 of Sicola with RAID as taught by Dekoning).

As per dependent claims **31** and **42**, the combination of DeKoning and Sicola teach, wherein the control section is configured to start to mirror data between said another one of the first disks and the at least one second disk before a plan of mirroring data between said one of the first disks and the at least one second disk is completed

(Column 4 line 44 to Column 5 line 8). *The Examiner notes that as shown supra, the system of Sicola is initially set to mirror without incident. However, the system will failover in the event of a failure thus anticipating the instant limitation of mirroring between another first disk before the initial mirror is complete.*

As per dependent claims 32 and 43, the combination of DeKoning and Sicola teach, wherein the control section is configured to start to mirror data between said another one of the first disks and the at least one second disk, if the error status of said another one of the first disks is greater than or equal to the error status of said one of the first disks (Column 4 lines 44-53 of Sicola).

Allowable Subject Matter

Claims 24-27 and 35-38 are objected to as being dependent upon rejected independent claims 22 and 33 respectively, but would be allowable if rewritten in correct and independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments filed 9 February 2007 have been carefully and fully considered but they are not persuasive.

With respect to applicant's argument located within the first full paragraph of the second page of the instant remarks (numbered as page 3) which recites:

"DeKoning et al are silent with respect to mirroring data between disks based upon an error status of a disk as claimed. In other words, DeKoning et al do not disclose or suggest using a spare disk dynamically based upon errors detected in other disks."

The Examiner agrees that DeKoning et al is silent on the dynamic usage of a spare disk based upon errors detected in other disks but has combined DeKoning et al with Sicola et al as noted in the rejection made *supra* to teach this deficiency.

With respect to applicant's argument located within the first paragraph of the third page of the instant remarks (numbered as page 4) which recites:

"Therefore, Sicola et al also do not disclose or suggest the starting and stopping of mirroring of data between disks based on an error status of a disk.

Furthermore, as with DeKoning et al, Sicola et al do not disclose or suggest using a spare disk dynamically based upon errors detected in other disks."

The Examiner respectfully disagrees. Sicola et al teach the use of a heartbeat to determine if a disk has failed. Upon determining that a disk has failed due to the heartbeat, or 'an error status of a disk' as instantly claimed', the system of Sicola et al fails over to another controller and thus another disk. As taught in Sicola et al Column 3 lines 56-65, mirroring is in use by the system. Thus when the heartbeat monitoring determines failure, the system of Sicola et al stops mirroring and fails over to start mirroring to a different disk.

With respect to applicant's argument located within the third paragraph of the third page of the instant remarks (numbered as page 4) which recites:

"Therefore, assuming that the teaching of these references could be combined, such combination would not disclose or suggest mirroring data between one of a plurality of first disks to at least one second disk based upon an error status of the one of the first disks."

The Examiner respectfully disagrees and refers Applicant to the comments made *supra* in addition to the rejection made *supra*.

With respect to applicant's argument located within the third paragraph of the third page of the instant remarks (numbered as page 4) continuing to the top of the fourth page of the instant remarks (numbered as page 5) which recites:

"Furthermore, such combination would also not disclose or suggest stopping mirroring data between one of the first disks and the at least one second disk and starting to mirror data between another one of the first disks and the at least one second disk according to an error status of the one of the first disks and the another one of the first disks as claimed."

The Examiner respectfully disagrees and refers Applicant to the comments made supra in addition to the rejection made supra.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew Bradley whose telephone number is (571) 272-8575. The examiner can normally be reached on 6:30-3:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald A. Sparks can be reached on (571) 272-4201. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MB

DAS/mb



DONALD SPARKS
SUPERVISORY PATENT EXAMINER